Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Canceled)

2. (Canceled)

3. (Currently amended) The method of claim ~~1~~ 33 wherein step (b) and step (c) are performed off line.

4. (Currently amended) The method of claim ~~1~~ 33 wherein step (d) is performed on line.

5. (Currently amended) The method of claim ~~1~~ 33 wherein said analytical functions are arrays of sine and cosine components $a_n^{(s)}$, $a_n^{(c)}$, $b_n^{(s)}$ and $b_n^{(c)}$ calculated according the following equations:

$$a_n^{(s)} \equiv f_n \sin(\omega_0 n\Delta t);$$

$$a_n^{(c)} \equiv f_n \cos(\omega_0 n\Delta t);$$

$$b_n^{(s)} \equiv n\Delta t \cdot a_n^{(s)};$$

$$b_n^{(c)} \equiv n\Delta t \cdot a_n^{(c)},$$

wherein f_n are taps of a low-pass filter; ω_0 is said nominal frequency component; Δt is a sampling time increment; $n = 1, 2, \ldots, N$; and N is the number of the samples in the frame.

6. **(Currently amended)** The method of claim ~~1~~ 33 wherein said analytical functions are arrays of sine and cosine components $\alpha_n^{(s)}$, $\alpha_n^{(c)}$, $\beta_n^{(s)}$ and $\beta_n^{(c)}$ calculated according the following equations:

$$\alpha_n^{(s)} \equiv f_n \sin[\omega_0 (n-p)\Delta t];$$

$$\alpha_n^{(c)} \equiv f_n \cos[\omega_0 (n-p)\Delta t];$$

$$\beta_n^{(s)} \equiv (n-p)\Delta t \alpha_n^{(s)};$$

$$\beta_n^{(c)} \equiv (n-p)\Delta t \alpha_n^{(c)},$$

wherein f_n are taps of a low-pass filter; ω_0 is said nominal frequency component; Δt is a time increment; $n=1,2,..,N/2$; $p=(N+1)/2$; and N is the number of the samples in the frame.

7. **(Currently amended)** The method of claim ~~1~~ 33 wherein step (b) of calculating the data indicative of values of the analytical functions is performed by utilizing a property of periodicity of the trigonometric functions.

8. **(Currently amended)** The method of claim ~~1~~ 33 wherein the step of generating said output signal representing said sine and cosine branches comprising the steps of:

(a) calculating consequently frame by frame for each k-th frame the intermediate quantities σ^k, ξ^k, I_0^k, Q_0^k, I_1^k, Q_1^k, A^k, B^k; and

(b) calculating the sine I^k and cosine Q^k branches;

wherein $k=1,2\ldots$; and the calculations are performed according to the following equations:

$$\sigma^k = \sin(\varphi^k);$$

$$\xi^k = \cos(\varphi^k);$$

$I_0^k = \sum_{n=1}^{N} S_n^k a_n^{(s)}$;

$Q_0^k = \sum_{n=1}^{N} S_n^k a_n^{(c)}$;

$I_1^k = \Delta\omega^k \sum_{n=1}^{N} S_n^k b_n^{(c)}$;

$Q_1^k = \Delta\omega^k \sum_{n=1}^{N} S_n^k b_n^{(s)}$;

$A^k = I_0^k + I_1^k$;

$B^k = Q_0^k - Q_1^k$;

and

$I^k = A^k \xi^k + B^k \sigma^k$;

$Q^k = -A^k \sigma^k + B^k \xi^k$,

wherein φ^k is the current phase estimate of the signal; and $\Delta\omega^k$ is said frequency component depending on the frame number.

9. **(Currently amended)** The method of claim ~~1~~ 33 wherein the step of generating said sine and cosine branches comprising the steps of:

(a) calculating frame by frame for each k-th frame the intermediate quantities S_n^{+k}, S_n^{-k}, σ^k, ξ^k, I_0^k, Q_0^k, I_1^k, Q_1^k, A^k, B^k; and

(b) calculating the sine I^k and cosine Q^k branches;

wherein $k = 1,2\ldots$; and the calculations are performed according to the following equations:

$S_n^{+k} = S_n^k + S_{N+1-n}^k$;

$S_n^{-k} = S_n^k - S_{N+1-n}^k$;

$\sigma^k = \sin(p\omega^k \Delta t + \varphi^k)$;

$\xi^k = \cos(p\omega^k \Delta t + \varphi^k)$;

$$I_0^k = \sum_{n=1}^{N/2} S_n^{-k} \alpha_n^{(s)};$$

$$Q_0^k = \sum_{n=1}^{N/2} S_n^{+k} \alpha_n^{(c)};$$

$$I_1^k = \Delta\omega^k \sum_{n=1}^{N/2} S_n^{-k} \beta_n^{(c)};$$

$$Q_1^k = \Delta\omega^k \sum_{n=1}^{N/2} S_n^{+k} \beta_n^{(s)};$$

$$A^k = I_0^k + I_1^k \ ;$$

$$B^k = Q_0^k - Q_1^k \ ;$$

and

$$I^k = A^k \xi^k + B^k \sigma^k;$$

$$Q^k = -A^k \sigma^k + B^k \xi^k,$$

wherein φ^k is the current phase estimate of the signal; $\Delta\omega^k$ is said frequency component depending on the frame number; and Δt is the sampling time increment.

10. (Canceled)

11. (Canceled)

12. (Canceled)

13. (Currently amended) The PLL module of claim ~~12~~ 35, wherein said at least one phase detector is further synchronized by a synchronization signal delivering phase information of a carrier to the PLL for determination of a sign of the envelope.

14. **(Currently amended)** The PLL module of claim ~~12~~ 35, wherein said at least one Table Memory Unit is further coupled to a computing unit for calculating said data indicative of values of analytical functions including trigonometric functions depending at least on said nominal frequency.

15. **(Currently amended)** The PLL module of claim ~~12~~ 35, wherein said analytical functions stored in said at least one Table memory Unit are arrays of sine and cosine components $a_n^{(s)}$, $a_n^{(c)}$, $b_n^{(s)}$ and $b_n^{(c)}$ calculated according the following equations:

$$a_n^{(s)} \equiv f_n \sin(\omega_0 n \Delta t) \;;$$

$$a_n^{(c)} \equiv f_n \cos(\omega_0 n \Delta t) \;;$$

$$b_n^{(s)} \equiv n\Delta t \cdot a_n^{(s)};$$

$$b_n^{(c)} \equiv n\Delta t \cdot a_n^{(c)} \;,$$

wherein f_n are taps of a low-pass filter; ω_0 is said nominal frequency component; Δt is the sampling time increment; $n = 1, \ldots, N$; and N is the number of the samples in the frame.

16. **(Currently amended)** The PLL module of claim ~~12~~ 35, wherein said analytical functions stored in said at least one Table memory Unit are arrays of sine and cosine components $\alpha_n^{(s)}$, $\alpha_n^{(c)}$, $\beta_n^{(s)}$ and $\beta_n^{(c)}$ calculated according the following equations:

$$\alpha_n^{(s)} \equiv f_n \sin[\omega_0 (n-p)\Delta t];$$

$$\alpha_n^{(c)} \equiv f_n \cos[\omega_0 (n-p)\Delta t];$$

$$\beta_n^{(s)} \equiv (n-p)\Delta t \alpha_n^{(s)};$$

$$\beta_n^{(c)} \equiv (n-p)\Delta t \alpha_n^{(c)},$$

wherein f_n are taps of a low-pass filter; ω_0 is said nominal frequency component; Δt is the sampling time increment; $n=1,2,.., N/2$; $p=(N+1)/2$; and N is the number of the samples in the frame.

17. **(Currently amended)** The PLL module of claim ~~12~~ 35, wherein the summing of the results of multiplication of the sampled digital signal S_n^k and said values of analytical functions by said at least one multiply-and-accumulate unit is performed frame by frame according to the following equation:

$$I_0^k = \sum_{n=1}^{N} S_n^k a_n^{(s)};$$

$$Q_0^k = \sum_{n=1}^{N} S_n^k a_n^{(c)};$$

$$I_1^k / \Delta\omega^k = \sum_{n=1}^{N} S_n^k b_n^{(c)};$$

$$Q_1^k / \Delta\omega^k = \sum_{n=1}^{N} S_n^k b_n^{(s)},$$

thereby obtaining the intermediate quantities I_0^k, Q_0^k, $I_1^k/\Delta\omega^k$, and $Q_1^k/\Delta\omega^k$.

18. **(Currently amended)** The PLL module of claim ~~12~~ 35, wherein the summing of the results of multiplication of the sampled digital signal S_n^k and said values of analytical functions by said at least one multiply-and-accumulate unit is performed frame by frame according to the following equation:

$$I_0^k = \sum_{n=1}^{N/2} S_n^{-k} a_n^{(s)};$$

$$Q_0^k = \sum_{n=1}^{N/2} S_n^{+k} a_n^{(c)};$$

$$I_1^k / \Delta\omega^k = \sum_{n=1}^{N/2} S_n^{-k} \beta_n^{(c)};$$

$$Q_1^k / \Delta\omega^k = \sum_{n=1}^{N/2} S_n^{+k} \beta_n^{(s)},$$

wherein

$S_n^{+k} = S_n^k + S_{N+1-n}^k$;

$S_n^{-k} = S_n^k - S_{N+1-n}^k$,

thereby obtaining the intermediate quantities I_0^k, Q_0^k, $I_1^k/\Delta\omega^k$, and $Q_1^k/\Delta\omega^k$.

19. **(Original)** The PLL module of claim 17 wherein said at least one Branch Computation Unit is configured to receive the intermediate quantities I_0^k, Q_0^k, $I_1^k/\Delta\omega^k$, $Q_1^k/\Delta\omega^k$ from said at least one multiply-and-accumulate units and generate the sine I^k and cosine Q^k branches according to the following equation:

$I^k = A^k\xi^k + B^k\sigma^k$;

$Q^k = -A^k\sigma^k + B^k\xi^k$,

wherein

$\sigma^k = \sin(\varphi^k)$;

$\xi^k = \cos(\varphi^k)$;

and

$A^k = I_0^k + I_1^k$;

$B^k = Q_0^k - Q_1^k$,

wherein φ^k is the current phase estimate of the signal.

20. **(Original)** The PLL module of claim 18 wherein said at least one Branch Computation Unit is configured to receive the intermediate quantities I_0^k, Q_0^k, $I_1^k/\Delta\omega^k$, $Q_1^k/\Delta\omega^k$ from said at least one multiply-and-accumulate unit and generate the sine I^k and cosine Q^k branches according to the following equation:

$I^k = A^k\xi^k + B^k\sigma^k$;

$Q^k = -A^k\sigma^k + B^k\xi^k$,

wherein

$\sigma^k = \sin(p\omega^k \Delta t + \varphi^k)$;

$\xi^k = \cos(p\omega^k \Delta t + \varphi^k)$;

and

$A^k = I_0^k + I_1^k$,

$B^k = Q_0^k - Q_1^k$,

wherein φ^k is the current phase estimate of the signal.

21. **(Currently amended)** In a multi-transmitter environment an array of PLL modules operating on a frame of said plurality of frames in accordance with claim ~~11~~ 35, wherein each PLL module of said array is implemented, respectively, for each transmitter of said multi-transmitter environment.

22. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in Cellular Phones and Wireless communication technology.

23. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in MRI and NMR medical systems.

24. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in RF communication components of digital receivers.

25. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in radar systems.

26. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in sonar systems.

27. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in navigation technology and apparatuses.

28. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in car safety systems.

29. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in RF-based systems for antenna positioning.

30. **(Currently amended)** The PLL module of claim ~~11~~ 35 for use in industrial applications for motor control.

31. **(Canceled)**

32. **(Canceled)**

33. **(New)** A method of operating a digital phase locked loop utilized for amplitude demodulation of a modulated signal, the method comprising:

(a) receiving an input digital sampled signal representing said modulated signal and divided into a plurality of frames having substantially equal number of samples,

wherein a frequency of said input digital signal for each frame ω^k of said plurality of frames having a frame number k is represented as a sum of a nominal frequency component ω_0, which is a common value to said plurality of frames, and a frequency component $\Delta\omega^k$, which is an increment depending on the frame number k and having an absolute value substantially smaller than a reversed value of a frame size N multiplied by a sampling time increment Δt;

(b) calculating data indicative of values of analytical functions including trigonometric functions depending at least on said nominal frequency component ω_0 for each frame from said plurality of frames;

(c) storing the data obtained in step (b);

(d) generating an output signal representing sine I and cosine Q branches of said digital phase locked loop by utilizing the data of the analytical functions stored in step (c), values of the component $\Delta\omega^k$ and the increment Δt for substantially all frames of said plurality of frames; and

(e) computing an envelope of said modulated signal and generating a demodulated signal.

34. **(New)** A method of operating a digital phase locked loop utilized for amplitude demodulation of a modulated signal, the method comprising:

(a) receiving an input digital sampled signal representing said modulated signal and divided into a plurality of frames having substantially equal number of samples;

(b) calculating and storing data independent of said frames indicative of values of trigonometric components of sine I and cosine Q branches;

(c) generating an output signal representing said sine and cosine branches using at least (i) mostly multiply-and-accumulate operation for substantially all of said frames, and (ii) said stored trigonometric component; and

(d) computing an envelope of said modulated signal and generating a demodulated signal.

35. **(New)** A digital phase locked loop (PLL) module utilized for amplitude demodulation of a modulated signal and configured for receiving a digital sampled signal divided into a plurality of frames having substantially equal

number of samples, wherein a frequency of said input digital signal for each frame ω^k of said plurality of frames having a frame number k is represented as a sum of a nominal frequency component ω_0, which is a common value to said plurality of frames, and a frequency component $\Delta\omega^k$, which is an increment depending on the frame number k and having an absolute value substantially smaller than a reversed value of a frame size N multiplied by a sampling time increment Δt, the PLL module comprising:

at least one Table Memory Unit configured for storing data indicative of values of analytical functions including trigonometric functions depending at least on said nominal frequency;

at least one multiply-and-accumulate unit provided with the data stored in said at least one Table Memory Unit and configured to sum the results of multiplication of said digital sampled signal and said values of analytical functions frame by frame;

at least one Branch Computation Unit receiving output provided by said at least one multiply-and-accumulate unit and generating an output signal representing sine I and cosine Q branches of said digital phase locked loop by utilizing the data of said analytical functions stored in said Table Memory Unit;

at least one phase detector coupled and being responsive to the Branch Computation Unit and configured for generating an error signal for locking the PLL and providing said error signal to said at least one Branch Computation Unit; and

an envelope computation unit configured for receiving said output signal representing the sine I and cosine Q branches from said at least one Branch Computation Unit and computing an envelope of said digital sampled signal.

36. **(New)** A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform

method steps for operating a digital phase locked loop utilized for amplitude demodulation of a modulated signal, the method comprising:

(a) receiving an input digital sampled signal representing said modulated signal and divided into a plurality of frames having substantially equal number of samples; wherein a frequency of said input digital signal for each frame ω^k of said plurality of frames having a frame number k is represented as a sum of a nominal frequency component ω_0, which is a common value to said plurality of frames, and a frequency component $\Delta\omega^k$, which is an increment depending on the frame number k and having an absolute value substantially smaller than a reversed value of a frame size N multiplied by a sampling time increment Δt;

(b) calculating data indicative of values of analytical functions including trigonometric functions depending at least on said nominal frequency component ω_0 for each frame from said plurality of frames;

(c) storing the data of the analytical functions obtained in step (b);

(d) generating an output signal representing sine I and cosine Q branches of said digital phase locked loop by utilizing the data of the analytical functions stored in step (c), values of the component $\Delta\omega^k$ and the time increment Δt for substantially all frames of said plurality of frames; and

(e) computing an envelope of said modulated signal and generating a demodulated signal.

37. **(New)** A computer program product comprising a computer useable medium having computer readable program code embodied therein for operating a digital phase locked loop utilized for amplitude demodulation of a modulated signal, the computer program product comprising:

computer readable program code for causing a computer to receive an input digital sampled signal representing said modulated signal and being divided into a plurality of frames having substantially equal number of samples; wherein a frequency of said input digital signal for each frame ω^k of said

plurality of frames having a frame number k is represented as a sum of a nominal frequency component ω_0, which is a common value to said plurality of frames, and a frequency component $\Delta\omega^k$, which is an increment depending on the frame number k and having an absolute value substantially smaller than a reversed value of a frame size N multiplied by a sampling time increment Δt;

computer readable program code for causing the computer to calculate data indicative of values of analytical functions including trigonometric functions depending at least on said nominal frequency component ω_0 for each frame from said plurality of frames;

computer readable program code for causing the computer to store the data indicative of values of analytical functions including trigonometric functions depending at least on said nominal frequency;

computer readable program code for causing the computer to generate an output signal representing sine I and cosine Q branches of said digital phase locked loop by utilizing the data of the analytical functions stored, values of the component $\Delta\omega^k$ and the time increment Δt for substantially all frames of said plurality of the frames; and

computer readable program code for causing the computer to compute an envelope of said modulated signal and to generate a demodulated signal.